REMARKS

The Examiner has rejected Claims 1 and 5 as being obvious over Bommier in view of Olcott or Johnson. In particular, the Examiner, relying on figures 2 and 5 and lines 9 to 54 of column 5, contends that Bommier teaches a brake disc comprising a carbon-carbon core layer and a carbon-carbon wear layer where the wear layer has a density lower than the core layer.

The Applicant requests that the Examiner reconsider this position.

In particular, the Applicant respectfully submits that the Examiner has mischaracterized the teachings of Bommier.

Bommier does indeed teach the provision of a carbon-carbon friction element. However, it is essential to note that the passage apparently relied upon by the Examiner (lines 9 to 54 of column 5) relates to the density of a preform for a disc, *i.e.* prior to densification, rather than to a completed disc, which is the subject of the presently pending Claims. Claim 1 is directed to an aircraft brake heat pack disc (not a preform); Claim 6 is directed to an aircraft brake heat pack brake disc (not a preform); Claim 15 is directed to an aircraft wheel and brake assembly comprising brake discs (not performs); and Claim 16 is directed to an aircraft brake heat pack comprising a brake disc (not a perform). Moreover, the skilled person understands from the teachings of Bommier that the finished disc would either have a core portion and a friction portion of substantially equal density or have a friction portion which is denser than the core portion.

During a densification process, as the skilled person understands, a liquid (*e.g.* pitch) or a vapor is forced to infiltrate the pores of an article, which is then pyrolized to produce a solid, dense article. Necessarily, articles are densified from the outside in, meaning that any blockage formed in the article's pores near its outer periphery of the article will prevent regions of the article inside that blockage from being densified. Therefore, it is well understood by the skilled person that, when preparing an article for densification, the outer regions of the article to be

densified should have a higher porosity than its inner regions, thereby ensuring that the center of the article is fully infiltrated.

Lines 1 to 23 of column 3 of Bommier discuss the porosities of the carbon fiber preforms which are later densified to produce the brake discs.

The pore measurements, it is made clear, are made only **after** the onset of densification, but before densification is complete. However, it is clear to the person having ordinary skill in the art that the porosities described are of the preforms, rather than the densified carbon-carbon structures, for at least the reasons that line 11 of column 3 notes that the apparent density at the end of densification is 1.8 gcm^{-3}. This, of course, is almost the maximum possible density of carbon-carbon.

It is also particularly noteworthy from lines 12 to 23 of column 3 that the porosity of the coarse textured substrate (corresponding to the undensified inner section of Bommier's disc) is 30%, while the porosity of the fine textured substrate (corresponding to the undensified outer/friction portions of the disc) is 42%. Accordingly, the density of the preform intended upon densification to form the friction region of a disc is lower than the density of a preform intended upon densification to form an inner portion of a disc. However, this does not describe the finished disc and does not lead the skilled person to believe that the finished, densified disc will have the same density profile. In fact, this is entirely in keeping with how the skilled person would make a preform to ensure that it is densified in as uniform a manner as possible (see above).

As is entirely clear from any reading of Bommier, the densities of these portions change upon densification. Indeed, if the pores of each substrate are of an ideal, open variety, each substrate, no matter the starting porosity, will be fully densified and thus have identical end densities. This is because the fibers and the material with which they are densified are the same material. Nevertheless, it is apparent to the skilled person that neither fibrous substrate is likely to be of completely open porosity or that 100% theoretical densification will result.

Moreover, the skilled person understands that the substrate having a higher porosity is likely to have a more open porosity i.e. fewer pores that are inaccessible to the densifying process. In turn, if anything, this means that the more porous fibrous substrate (*i.e.* the precursor for the friction region) will be *more* completely densified than the less porous fibrous substrate (*i.e.* the precursor for the core region), and accordingly would be denser.

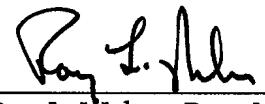
It is respectfully submitted that Bommier teaches the skilled person to provide a carbon-carbon brake disc where core and friction regions are of the same density or where the friction regions may be more dense than the core region. The passage cited by the Examiner is fully commensurate with this teaching. Moreover, the Applicant submits that the Examiner's interpretation of Figures 2 and 5 of Bommier appears to be derived from her understanding of the present invention, rather than the teachings of Bommier. Such is a classic impermissible hindsight analysis.

In light of the foregoing, in order for the Examiner's obviousness rejection to be well founded, Olcott or Johnson must teach the skilled person to provide a carbon-carbon core impregnated with a refractory carbide and with a wear layer having a density lower than the core layer. The Applicant has consistently demonstrated during the prosecution of this application that neither Olcott nor Johnson provides such a teaching. In fact, the opposite is true. Both Olcott and Johnson teach that refractory carbides make excellent friction materials and thus the skilled person would be motivated to provide such materials at the wear face, and not in the core layer. Accordingly, it is submitted that Claims 1 and 5 are inventive over Bommier in view of Olcott or Johnson.

The Examiner also contends that Claims 2, 6, 7, 9, 15 and 16 are obvious in view of Olcott or Johnson and further in view of Purdy or Dietrich. In response the Applicant submits that the same arguments, *mutatis mutandis*, apply. It is therefore submitted that Claims 2, 6, 7, 9, 15 and 16 are inventive over Bommier in view of Olcott or Johnson and further in view of Purdy or Dietrich.

In view of the foregoing amendments and arguments presented herein, the Applicant believes that he has properly set forth the invention and accordingly a formal Notice of Allowance of the claims is earnestly solicited. Should the Examiner care to discuss any of the foregoing in greater detail, the undersigned attorney would welcome a telephone call.

Respectfully submitted,



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